



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/696,462	10/29/2003	Jene A. Golovchenko	HVD2093	5987
26247	7590	01/09/2008		
THERESA A LOBER T.A. LOBER PATENT SERVICES 45 WALDEN ST CONCORD, MA 01742			EXAMINER GUHARAY, KARABI	
			ART UNIT 2889	PAPER NUMBER
			MAIL DATE 01/09/2008	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/696,462

Applicant(s)

GOLOVCHENKO ET AL.

Examiner

Karabi Guharay

Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on Amendment, filed on 10/26/07.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-6, 8-12, 15 and 31-41 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6, 8-12, 15 and 31-41 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 10/26/07.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_.

***Response to Amendment***

Amendment, filed on 10/26/2007 has been considered and entered.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 4, 6, 8, 9, 11, 15, 32, 34-37 and 40 are rejected under 35 U.S.C. 102(e) as being anticipated by Shin et al. (US 6515339).

Regarding claims 1, 32 & 34, Shin et al. disclose a carbon nanotube device (see Fig 4, 5A, 6A & Fig 26) comprising a substrate (10) including an aperture (16) extending from a front surface to a back surface with the aperture open only at the front surface and the back surface (see Fig 5A; lines 10-20 of column 6), at least one pair of electrically conducting contact pad 12 formed on one of the front and back substrate surfaces being separated by the aperture (see Fig 6B) a carbon nanotube catalyst region (18) disposed on top of each of the contact pad (12) in alignment with the edge of the aperture and exposed at selected substrate surface and at least one carbon nanotube extending across the aperture and accessible through the aperture from both the front surface and the back surface of the substrate, each end of the carbon

nanotube contacting an exposed catalyst region on a contact pad at the selected substrate surface (lines 51-67 of column 5 & see Fig 6A & 6B).

Regarding claim 4, Shin et al. disclose that the carbon nano-tube comprises a semi-conducting carbon nanotube (lines 21-23 of column 4).

Regarding claim 6, Shin et al. disclose that at least one carbon nano tube comprises plurality of carbon nanotube (see Fig 7B).

Regarding claim 8 and 37, Shin et al. disclose that the substrate comprises a semi-conducting substrate including silicon substrate (lines 1-4 of column 6).

Regarding claims 9, 11, Shin discloses that the substrate is a membrane made of silicon dioxide having an aperture there through and on a top surface of which is disposed the contact pads and catalytic region (see fig 3B, and lines 1-4 of column 6).

Regarding claim 15, Shin et al. disclose that at least one pair of electrically conducting contact pads comprises a plurality of pairs of contact pads disposed at locations around the aperture (see Fig 7B).

Regarding claims 35-36, Shin et al. disclose that contact pads (electrodes in Fig 16b or source and drain 210, 220 of Fig 20-21) make electrical connection to circuitry and to one device on the selected substrate (lines 50-63 of column 10).

Regarding claim 40, Shin et al. disclose that the catalyst region each comprises a material selected from the group consisting of Fe, Co, and Ni (lines 1-3 of column 12).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 10, 31, 33, 38 & 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shin et al. as applied to claim 1.

Regarding claim 10, Shin discloses all the limitations of claim 10, except for the membrane being made of silicon nitride; instead Shin discloses silicon oxide membrane.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use silicon nitride instead of silicon oxide since these are well known equivalent for use in support member.

Regarding claims 31, 33 & 41, Shin et al. disclose all the limitations of claims 31, 33 and 41, except for a region of the catalytic region are less than about 2 nm thickness as claimed in claim 31 or covering substantially the entire contact pad or covering no greater than  $17 \times 10^{15}$  atoms per square centimeter.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize to have above claimed coverage of contact pad by the catalytic region since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. ***MPEP 2144.05 II A.***

Regarding claim 38, Shin discloses a substrate having an aperture through the substrate, however, does not disclose a membrane having an aperture wherein the membrane is supported by a substrate.

However, for a thin sheet membrane or diaphragm, it would have been obvious to one having ordinary skill in the art at the time the invention was made to support the membrane by a substrate in order to have a rigid structure.

Claims 2-3, & 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shin et al. as applied to claim 1 above, and further in view of Brown et al. (US 6297063)

Regarding claims 2-3, & 5, Shin discloses all the limitations of claims 2-3 & 5 except for carbon nanotube being single walled or multi-walled and comprises a metallic carbon nanotube.

However, Brown et al. in the same field of growing suspended or cantilevered nanotubes (figs 6B-6C) discloses that such nano-wire connections are suitable for both single wall or multi-wall carbon nano-tube (lines 25-28 of column 6) and further teaches metallic carbon nano-tube (lines 28-33 of column 5) for suspended or cantilevered nano-tubes .

Thus it would have been obvious to one having ordinary skill in the art at the time the invention was made to use either SWNT or MWNT and metallic CNT in the device of Shin et al. since MWNT or SWNT and metallic CNTs are suitable for suspended nano-wires.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shin et al. (US 20020167374) further in view of Bradley et al (US 20040043527).

Shin teaches all the limitations set forth, as described above, except the support structure is aligned between a source of electrons and an electron detector for transmission electron microscopy of the carbon nanotube.

In the same field of endeavor, Bradley et al ('527) teach a carbon nano-tube device comprising a support structure holding a nanotube (230; paragraphs 55-56) is aligned between a source of electrons (150, 240) and an electron detector (260) for transmission electron microscopy of the carbon nanotube in order to decrease the electrical resistance of the measuring device (paragraph 44).

Hence, it would have been obvious at the time of the invention to one of ordinary skill in the art to incorporate the nanotube structure of Shin et al. in the measuring device of Bradley et al ('527). Motivation to combine would be to improve the measuring device's accuracy.

Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shin et al. as applied to claim 1 above, and further in view of Hunt et al. (US 2002/0167374)

Regarding claim 39, Shin et al. fails to disclose that the contact pad comprises a metal including at least one material selected from the group consisting of platinum and Cr.

However, platinum and chromium are suitable materials for the contact pad as evidenced by Hunt et al. (see paragraph 60).

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use platinum or chromium, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use. See MPEP 2144.07.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

### ***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karabi Guharay whose telephone number is 571-272-2452. The examiner can normally be reached on Monday-Friday 9:00 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar D. Patel can be reached on 571-272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Application/Control Number:  
10/696,462  
Art Unit: 2879

Page 8

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

*K. Guharay*  
Karabi Guharay  
Primary Examiner  
Art Unit 2879  
1/4/08